99-D-106, Model Validation and Systems Certification Center, Sandia National Laboratories, Albuquerque, New Mexico

(Changes from FY 2000 Congressional Budget Request are denoted with a vertical line [|] in the left margin.)

Significant Changes

As a result of value engineering recommendations, several changes have been made to the facility requirements and the communications methodology for this project. However, the changes do not impact overall project TEC or TPC.

- The facility space requirements were reduced from 19,900 square feet to 16,000 square feet as a result of a decision not to relocate the machine shop (building 6587) from its current location.
- The communications methodology was revised: the number of test capabilities that will be direct connected via fiber and copper cables to the Command and Control Center (CCC) will be increased from two to seven; the remaining four of the 11 test capabilities will communicate with the CCC via radio transmission (RF).
- An additional uninterrupted power supply system and switchgear were added to the project.

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost ($000)	Total Project Cost ($000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 1999 Budget Request *(Preliminary Estimate)*	2Q 1999	2Q 2000	3Q 2000	4Q 2001	18,219	19,111
FY 2000 Budget Request	3Q 1999	4Q 2000	3Q 2000	4Q 2002	18,230	19,122
FY 2001 Budget Request *(Current Baseline Estimate)*	4Q 1999	3Q 2001 [a]	4Q 1999 [a]	4Q 2002	18,230	19,122

[a] Schedule milestones have been changed slightly to reflect a change in the phasing of the project. Building abatement and interior demolition work will begin concurrent with design.

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
1999	1,600	1,600	508
2000	6,475 [a]	6,475	6,276
2001	5,200	5,200	5,927
2002	4,955	4,955	5,519

3. Project Description, Justification and Scope

The Department of Energy (DOE) has the statutory and mission responsibility for the design, production, maintenance, retirement and dismantlement of the United States nuclear weapons. In support of this mission, Defense Programs is responsible for the engineering development of the nonnuclear components and the overall systems engineering and integration for all nuclear weapons, including the integration of nuclear weapons with their delivery vehicles. Responsibilities also include assuring that weapons' military characteristics (MCs) and Stockpile-to-Target-Sequence (STS) requirements are met for hostile, normal, and abnormal environments.

Pertinent, reliable, and timely information is key to fulfilling these responsibilities, and in part, this information is obtained through laboratory testing and corresponding analysis. Testing is performed in five primary areas in support of nonnuclear components and systems:

- Development testing (testing to certify design intent)
- Experimentation to validate and certify analytical models
- Product certification (such as neutron generators and AT 400 containers)
- Surveillance testing, which sometimes includes investigative testing
- Testing to support dismantlement.

Confidence in certifying the stockpile has been and will continue to be contingent upon high-quality, reliable, and pertinent data and competent analysis of that data, although the approach to obtain and analyze data and the nature of the data will change in response to DOE stockpile stewardship challenges.

In support of DOE's Science-Based Stockpile Stewardship and Sandia's weapon system performance and surety missions, the Model Validation and System Certification Test Center (MVSCTC) will:

- Enable existing, essential test capabilities to continue to provide data necessary for certifying that weapons systems will function as designed in a variety of normal and abnormal environments.

[a] Original appropriation was $6,500,000. This was reduced by $25,000 for the FY 2000 rescission enacted by P.L. 106-113.

- Enhance existing capabilities to facilitate delivery of large volumes of experimental data and information required to confirm prediction of weapon system behavior by computational tools.
- Replace an aging and, to a large extent, non-existent communications infrastructure to enable the integration of command and control along with data collection, processing, archival, and distribution systems, and thereby enhance operational effectiveness and efficiencies for meeting strategic needs.

The MVSCTC Project will provide a modern communications infrastructure coupled with a common control/operations facility for Sandia's eleven full-scale environmental test capabilities located in Tech Area III. The concept design of the MVSCTC reflects an optimized operational system composed of three subsystems including: Communications Infrastructure, Command and Control, and facilities to accommodate related operational functions.

The MVSCTC Project will implement an operational system that allows for both remote and local control of each of the test capabilities. This system will allow for more effective and efficient management of test operations and provide flexibility in meeting programmatic and specific customer needs. The Command and Control Center (CCC) will provide the remote control; Mobile Interface Units (MIUs) will provide local data acquisition and command and control to field test capabilities.

The MVSCTC communications infrastructure will be comprised of a communications hub (the CCC) and supporting infrastructure (communications media from the CCC to each of the test sites) that will link Sandia's environmental test capabilities to other Sandia personnel involved in modeling, simulation, design and related activities. Additionally, the infrastructure will link the MVSCTC into the nuclear weapons complex (NWC) electronic information network. The communications infrastructure will consist of high-capacity cabling installed in an underground concrete-encased ductbank of conduits and radio frequency (RF) and microwave technologies. The capacity and robust nature of this infrastructure protection ensures not only the viability of the communications infrastructure over the long run but also allows advances in communications technology to be easily incorporated over the life of the system.

Two MIUs, which are self-contained mobile trailers that house the equipment necessary to control the test capabilities and collect data from them, will be used for local control of field test capabilities. Shared use of these two MIUs to support test facilities standardizes and reduces the equipment that is otherwise required at each of the test facilities. The MIUs are being built as part of Sandia's Modernization Program; only the purchase and installation of the pertinent communications infrastructure termination equipment to be placed in the MIUs as part of the MVSCTC are included in this capital project request.

Facilities to Accommodate Related Operational Functions

The MVSCTC will use approximately 16,000 gross square feet within Building 6584 and its related site for the collocation of existing functions (command and control capabilities, customer support, staff offices, and light laboratories), as well as new functions (communications hub and network support equipment.) This new operations center will allow for operational effectiveness and efficiency that has previously been impossible within the current configuration of functions dispersed across multiple facilities.

Special Facilities

Communications Infrastructure

The communications infrastructure is the overall system of fiber-optic and copper lines and related infrastructure elements. To provide needed communications capacities, two unspliced 48-fiber cables will be installed from the CCC to each direct connected test capability. Use of unspliced runs assures longevity of the infrastructure and maximum information transmission capacity.

In addition to the fiber-optic cable, copper lines consisting of up to 30 pairs of telephone cable and 50 pairs of individually-shielded instrumentation cable will be installed. The telephone cable provides 24-hour service to each test capability for telephone, fire, and intrusion systems.

All fiber-optic and copper lines will be installed in a PVC ductbank, placed in a trench and encased in concrete. The depth of the concrete encased ductbank will be 30-inches below grade. Associated manholes and/or junction boxes will be locked.

The proposed communications infrastructure is located primarily within Sandia's Tech Area III. However, the main fiber optic trunk, which is to be installed from the existing Tech Control Center (TCC) in the Technology Support Center (TSC, Building 6585) to the MVSCTC, extends beyond the Tech Area III borders. The TSC is located just outside Tech Areas III and V, approximately 400 linear feet from the MVSCTC common control facility in Building 6584. The Tech Control Center (TCC) in the TSC will provide the point of physical connection into existing telecommunications infrastructure.

Planned connection to the existing copper telephone infrastructure will occur at a location close to the TSC (specifically, Building 6585A containing an optical remote) or at an additional trunk breakout location near the Centrifuge Facility, Building 6526. The actual connection point will depend on modifications that Sandia is presently making to the telephone infrastructure.

Command/Control System

The command and control system includes all the electronic systems required to manage the communications systems, interface the information systems to the test capabilities and allow operators, engineers, and customers to control capability functions and observe and record operations. Electronic equipment required to perform these functions includes: digital network and video switching and transmission hardware; computer systems; video display and recording systems; and hardcopy peripherals. The majority of this equipment will be located in the CCC. Hardware required for the communications network completion at the test site or in the MIUs is also included in the MVSCTC Project scope.

Project Milestones:

FY 1999:	Start Design	4Q
	Complete Building Abatement and Interior Demolition Work	4Q
FY 2000:	Complete Facilities Design	3Q
	Complete Command and Control Design	4Q

	Start Facilities Construction	3Q
FY 2001:	Start Command and Control Construction	1Q
	Complete Facilities Construction	4Q

4. Details of Cost Estimate

(dollars in thousands)

	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications -$691)	1,228	938
Design Management Costs (0.7% of TEC)	135	238
Project Management Costs (0.7% of TEC)	123	122
Total Design Costs (8.2% of TEC)	1,486	1,298
Construction Phase		
Improvements to Land	280	227
Buildings	2,918	2,907
Special Equipment	9,247	8,586
Standard Equipment	486	1,473
Inspection, Design and Project Liaison, Testing, Checkout and Acceptance	500	422
Construction Management (1.6% of TEC)	297	381
Project Management (0.9% of TEC)	172	154
Total Construction Costs (76.2% of TEC)	13,900	14,150
Contingencies		
Design Phase (1.2% of TEC)	215	213
Construction Phase (14.4% of TEC)	2,629	2,569
Total Contingencies (15.6% of TEC)	2,844	2,782
Total, Line Item Costs (TEC) [a]	18,230	18,230

5. Method of Performance

This work will be accomplished using a Sandia administered fixed-price, incentive, design-build contract.

[a] Escalation rates taken from the January 1998 DOE Price Change Index. Current estimate based on Conceptual Design Document dated October 27, 1998.

6. Schedule of Project Funding

(dollars in thousands)

	Prior Years	FY 1999	FY 2000	FY 2001	Outyears	Total
Project Cost						
Facility Costs						
Design	0	35	1,251	415	0	1,701
Construction	0	473	5,025	5,512	5,519	16,529
Total, Line item TEC	0	508	6,276	5,927	5,519	18,230
Total Facility Costs (Federal and Non-Federal)	0	508	6,276	5,927	5,519	18,230
Other Project Costs						
Conceptual design costs	306	0	0	0	0	306
NEPA documentation costs	20	0	0	0	0	20
Other ES&H costs	0	6	14	14	14	48
Other project-related costs	82	106	98	110	122	518
Total, Other Project Costs	408	112	112	124	136	892
Total Project Cost (TPC)	408	620	6,388	6,051	5,655	19,122

7. Related Annual Funding Requirements

(FY 2002 dollars in thousands)

	Current Estimate	Previous Estimate
Annual facility operating costs [a]	128	141
Annual facility maintenance/repair costs [b]	768	818
Programmatic operating expenses directly related to the facility [c]	5,733	5,733
Capital equipment not related to construction but related to the programmatic effort in the facility	235	235
Utility costs	64	77
Total related annual funding (operating from FY 2002 through FY 2041)	6,928	7,004

[a] Facility operating costs will average $117,000 for labor and $11,000 for materials per year. An average of 1.7 staff years will be required to operate all facilities. The facility does not replace any other facility.

[b] Maintenance and repair costs for all facilities average $328,000 for labor and $440,000 for materials. A total of 4.8 staff years per year is required to maintain all facilities.

[c] Estimate reflects annual programmatic operating expenses associated with the operations and maintenance of the eleven test capabilities that are to be connected through the communications infrastructure to the common command and control facility implemented by the MVSCTC. Estimate includes: all loaded labor associated with direct test activities as well as preventative maintenance; facility costs (space charges, direct purchases, service contracts, etc.) and associated overhead loads. Estimate also includes projected, annualized operating expenditures incurred to maintain, repair, or replace-in-kind the existing equipment in these test capabilities.